

# LESSON 2: Scavengers and Decomposers

## LESSON'S CONCEPT

Scavengers and decomposers are essential to the recycling of organic matter.

### PURPOSE

Students study about scavengers and see examples of the actions of decomposers.

### OVERVIEW

In this lesson students will:

- Observe evidence of decomposition.
- Locate some scavengers on the school grounds.
- Make a mural of the scavengers they observed.
- Design a habitat in a container for a specific scavenger, collect several scavengers from the school grounds, keep them for observation for 24 hours, and then release them.
- Conduct research, using reference books on a specific scavenger.
- Grow and compare colonies of decomposers, such as molds, yeast, and bacteria.
- Play a game to identify specific scavengers and decomposers.

### CORRELATIONS TO CALIFORNIA'S CONTENT STANDARDS AND FRAMEWORKS AND TO BENCHMARKS FOR SCIENCE LITERACY

- Students observe ways decomposers change organic matter.
  - "All organisms need energy and matter to live and grow. As a basis for understanding this concept, students know . . . decomposers, including many fungi, insects, and microorganisms, recycle matter from dead plants and animals." (*Science Content Standards, Grades K–12; Grade 4; Life Sciences, Standard 2c*)
  - "Organisms in ecosystems exchange energy and nutrients among themselves and with the physical environment. As a basis for understanding this concept, students know . . . over time, matter

is transferred from one organism to others in the food web, and between organisms and the physical environment." (*Science Content Standards, Grades K–12; Grade 6; Ecology, Standard 5b*)

- "Animals and plants sometimes cause changes in their surroundings." (*Benchmarks for Science Literacy, page 72*)
- Students observe scavengers on the school grounds and design habitats for specific scavengers, such as earthworms, sow bugs, beetles, and ants.
  - "All organisms need energy and matter to live and grow." (*Science Content Standards, Grades K–12; Grade 4; Life Sciences, Standard 2*)
  - "By the end of the 5th grade, students should know that . . . Insects and various other organisms depend on dead plant and animal material for food." (*Benchmarks for Science Literacy, page 116*)
- Students write descriptions and facts about specific scavengers. They also write a song about decomposers or scavengers.
  - Students "choose the form of writing (e.g., personal letter, letter to the editor, review, poem, report, narrative) that best suits the intended purpose." (*English–Language Arts Content Standards for California Public Schools, Kindergarten Through Grade Twelve, page 37*)
- Students sing a song about decomposers or scavengers.
  - "Students sing or perform on instruments a varied repertoire of music." (*Visual and Performing Arts Framework, Music: Creative Expression Component, Goal 3, page 64*)

## SCIENTIFIC THINKING PROCESSES

observing, communicating, comparing, classifying, relating

## TIME

30 minutes to prepare for the lesson; 45–60 minutes per day for six days to implement

the lesson; plus time a couple of weeks later to observe the results of decomposers growing

## VOCABULARY

decomposition, decomposers, organisms, scavengers

## PREPARATION

- \_\_\_ 1. Read the “Background Information for the Teacher” at the end of this lesson.
- \_\_\_ 2. Locate an area in the school’s neighborhood and/or on the school grounds where students can find scavengers, such as ants, sowbugs, slugs, and worms. Locate rocks, pieces of wood, or paper that students can look under. If your school grounds do not have any rocks or pieces of wood, you will need to find an empty lot within walking distance where these things are present. You could also place (approximately two weeks in advance) some rocks or pieces of wood on the soil, in a planter, or near a corner of a lawn area on the school grounds. (Tell the custodian what you are doing, so the items will not be moved.)
- \_\_\_ 3. Make two (or more) copies and cut apart the “Scavengers and Decomposers Cards” to provide one card for each student (pages 468–471).
- \_\_\_ 4. Decide whether you want students to write the results of their investigations in their journals in an open format or have student use the “Decomposers Investigation Sheet.” If you decide to use the “Decomposers Investigation Sheet,” make a copy for each student (page 472).

## MATERIALS

### For “Pre-Activity Questions”

- \_\_\_ Examples of nutrients or things that can represent nutrients, such as compost, plant fertilizer, vitamins, a protein drink, a piece of fruit, a leaf, and a stuffed animal to represent a dead animal
- \_\_\_ Butcher paper for a mural

### For “Part I, Learning About Scavengers”

- \_\_\_ Quart-sized jar or other transparent container with lid for each group of students

- \_\_\_ Soil, rocks, and other materials for habitats (for scavengers) in containers

### For “Part II, Growing Decomposers”

- \_\_\_ One resealable plastic sandwich bag for each group of two or three students
- \_\_\_ Masking tape and marker
- \_\_\_ Half cup of garden soil
- \_\_\_ Piece of bread and pieces of fruits and vegetables
- \_\_\_ Wet paper towels
- \_\_\_ Two slices of a banana
- \_\_\_ Teaspoon of active yeast
- \_\_\_ Four tablespoons of cottage cheese
- \_\_\_ Magnifying lenses (one for each pair of students)
- \_\_\_ Students’ journals or a copy of the “Decomposers Investigation Sheet” for each student

### For “Part III, Playing a Game About Scavengers and Decomposers”

- \_\_\_ Two or more copies of “Scavengers and Decomposers Cards” (to provide one card for each student)
- \_\_\_ Masking tape or a clothespin to tape or pin a card on the back of each student

## PRE-ACTIVITY QUESTIONS

### Day 1

- A. Tell students that in this lesson they will learn more about decomposers, the organisms that decompose organic material. They will also learn about scavengers, animals that eat dead things or the wastes of living things. Ask students:
  - What are nutrients? Show examples of nutrients that you obtained (see “materials” list). *Nutrients include protein, vitamins, minerals, and carbohydrates and provide nourishment to keep an organism alive.*
  - How do plants get the nutrients that they need in order to grow? *They get them from the soil.*

- How do the nutrients get into the soil?  
*Through the work of scavengers and decomposers.* (Students might not know this at this time. Record their answers and refer to their answers at the end of this lesson.)

- B.** Lead students on a walk around the school's neighborhood and/or on the school grounds to locate organisms (living things) that live under leaves, rocks, or pieces of wood. Students should record in their journals what they see. Was there anything growing on any of the rotting or decomposing things; e.g., mold?

**Note:** Ask students not to pick up the organisms but, instead, to point out to other students what they found.

- C.** Go back in the classroom and ask students to draw what they saw, which could include animals, such as ants, sow bugs, and millipedes.
- D.** To illustrate what the students observed, have them make a mural on a piece of butcher paper, using the drawings of what they observed on the school grounds.

## PROCEDURE

### Day 2

#### Part I, Learning About Scavengers

- A.** Ask students, "What are scavengers?" *They are animals that eat dead things.* Have students look up the word *scavenge* in the dictionary. They should find out that "to scavenge" means to clean away or feed on carrion or refuse; therefore, scavengers feed on dead things. Ask students to name some scavengers and to describe what they eat. *Vultures, crows, seagulls, coyotes, and ants eat dead animal bodies. Some scavengers, like earthworms, eat and break down dead plant parts.*
- B.** Ask students to look at the mural of the organisms they observed on the school grounds. Tell them that most of the animals they saw are called scavengers. They scavenge through organic matter and eat it. These include worms, beetles, sow bugs, millipedes, slugs, and ants. Where do scavengers live? *In and on top of soil, in logs, under rocks, in damp places.*
- C.** Lead students on a walk on the school grounds to look for additional scavengers under pieces of wood, newspapers, rocks,

and other debris. Look for sow bugs, millipedes, worms, and beetles. Tell students to pay particular attention to each scavenger's habitat (area where it lives), because they will be designing a habitat for them in a container.

- D.** Back in the classroom, ask how many more scavengers students found the second time. Why did they see more scavengers? *They knew where to look and what to look for.*
- E.** Have students add drawings of scavengers to the mural.

**Homework Assignment:** Ask students to begin designing a habitat in which to keep some scavengers. They can draw these, labeling what they will put in the container to make certain that their scavenger is provided with its basic needs (i.e., air, food, water, and shelter).

### Day 3

- F.** Ask students to share their homework assignments. Tell students that they will work in groups to design habitats, where they will keep some scavengers for 24 hours.

**Note:** The 24-hour rule of keeping an organism provides opportunities for students to observe closely an animal in a humane manner (without causing the animal undue stress or death) and teaches students to respect other living things. After 24 hours each animal should be released in the exact spot where it was found.

- Have students use quart jars or other containers with lids in which to design a habitat for their scavengers. Lids should have holes punched in them to allow air into the containers.
  - Ask groups of students to select a specific scavenger and to make a habitat for this organism in the container. Students must make certain that the scavenger is provided with air, food, water, and shelter.
  - Tell students that they cannot collect their scavengers until all the habitats they created have been approved by you.
- G.** When all groups have completed designing the habitats, lead them on a collecting expedition on the school grounds and allow each group to collect two to five scavengers. Students should record in their journals the exact location where they found their

organisms and the type and number of organisms they collected.

**Note:** The containers should be kept away from direct sunlight.

- H.** Back in the classroom, organize a viewing and explanation exhibit. Make sure to allow time for students to observe all of the scavengers that were collected.

#### Day 4

- I.** On the following day have the students observe their scavengers, sketch them, and write two descriptive sentences about them.
- J.** Then ask students to release their organisms in the exact location where they were collected.
- K.** Decide with the class what to do with the soil and plastic containers. *Reuse the soil; reuse or recycle the plastic containers.*

## Part II, Growing Decomposers

### Day 5

- A.** Set out the materials, including pieces of bread, fruit, and vegetables, yeast, cottage cheese, and plastic resealable sandwich bags.
- B.** Ask students whether they have found food in the refrigerator that had mold or slimy stuff on it. Explain that these are decomposers eating and decomposing the food.
- Tell students that they will try to grow different decomposers in a plastic bag.
  - Separate the class into groups of two or three students.
  - Provide a plastic resealable sandwich bag to each group of students and a piece of tape on which students should use a marker to write their names and the numbers of their bags.
- C.** Assign one or two groups to each bag and give them directions (listed below) on how

Picture intentionally deleted.

Two students from Janet Cohen's sixth-grade class at Gold Trail Elementary School place bread in a plastic bag to observe how the bread will change over time.

Two students from Janet Cohen's sixth-grade class at Gold Trail Elementary School place soil in a plastic bag to observe evidence of decomposers growing in the soil over time.

Picture intentionally deleted.

to set up each bag. Ask students to describe in their journals the appearance of the items in the bag and predict how these items will change over time.

**Bag 1:** Place a piece of bread or pieces of vegetables and a wet paper towel in the plastic bag. Seal the contents, describe the appearance of the items in your journals, and store the bag in a dark place.

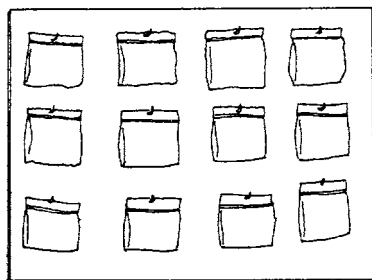
**Bag 2:** Either drag some pieces of food scraps in the dirt outside or add a half teaspoon of soil to the bag. Moisten the contents. Seal the contents, describe the appearance of the items in your journals, and store the bag in a dark place.

**Bag 3:** Place a slice of a banana inside a plastic bag and sprinkle the banana with a half teaspoon of active yeast. Seal the contents, describe the appearance of the items in your journals, and store the bag in a dark place.

**Bag 4:** Sprinkle some garden soil or dirt from the school grounds on a couple of tablespoons of cottage cheese in a plastic bag. Seal the contents, describe the appearance of the items in your journals, and store the bag in a dark place.

**Bag 5:** Add a half cup of garden soil to a plastic bag. Add water to make the soil moist, but not soggy. Seal the contents, describe the appearance of the items in your journals, and store the bag in a dark place.

**Note:** The bags can be kept in the dark by storing them in a box with a lid. The bags can also be stored on a board in which small hooks are affixed. A hole can be punched in each bag and the bags hung on the hooks. The entire board can be placed in a dark area or covered with cloth or butcher paper.



- D. After students have described the items in the bags, place the bags back in a box or hang the bags on the hooks and leave them undisturbed for a week.

## Day 12

**Safety Caution: Do not to open the plastic bags.** These bags may contain high concentrations of spores, which may be harmful if inhaled or exposed to an open cut or abrasion. Students should be cautioned not to open or puncture the bags. Students should report any accidental opening to the teacher.

- E. At the end of a week, redistribute the bags and have students describe what they see without opening the bags.
- Provide magnifying lenses for students to take a closer look at the contents of the bags through the plastic.
  - Ask students to draw and describe in their journals what they see. Or distribute the “Decomposers Investigation Sheet” for student to complete. If using the investigation sheets, collect these for students to use in a week.
  - Place the bags back in the box or hang the bags back on the hooks and leave them for another week.
  - Advise students to wash their hands after returning their bags.

## Day 19

- E. At the end of week two, redistribute bags and magnifying lenses and have students make their final observations of the contents of their bags without opening them.
- Ask students to draw and describe in their journals what they see. Or redistribute the “Decomposers Investigation Sheet” for student to complete.
  - Direct students to carefully return their unopened bags to the teacher for proper disposal. If the contents of the bags are not to be composted, then it would be prudent to attach a note for the janitor to read informing him or her that the trash bags contain student projects of decomposing food, which may contain high concentrations of spores that should not be inhaled.
- G. Tell students that they may not be certain what decomposers are growing in their bags, but most likely there will be some of the following:
- **Mold.** Mold is a thread-like organism; some threads will have dark round sacs

that contain spores. Spores make new cells.

- **Yeast.** Yeast cells are shaped like an egg. Some have little bumps on them called buds. These buds grow bigger and break away to become new yeast cells.
- **Bacteria.** Although mold and yeast will also grow in the cottage cheese, there might be small colonies of bacteria that are yellow, cream-colored, or red that look shiny and moist. The grayish cob-web-like look in soil indicates the presence of actinomycetes, a type of bacteria.

- H. Have students describe in their journals what they saw in their bags and compare their findings to what they predicted would be in the bags.
- I. Conduct a discussion on what the students observed.

### Part III, Playing a Game About Scavengers and Decomposers

#### Day 6

- A. Use the cards in this lesson and go over each living thing with the class.
- B. Provide one card to each student and ask students to find out two facts about their organisms. For example, what does this organism eat and where does it live? Ask students to write the facts on the backs of their cards.
  - Allow students to go to the library or provide books for students to use in their research (see “Resources” at the end of this lesson).
  - If students have access to the internet, they can obtain information on the computer.
  - If two students have the same organism, they can work together, but they will need to research a total of four facts about their organism.
- C. After students have completed their research, ask them to report the information to the class.
- D. Gather all the scavenger and decomposer cards and shuffle them. Tell students that they will now play a game. Each student will get a card placed on his or her back. Students will need to ask questions from other students to try to determine what decomposer or scavenger cards they have on their backs.

1. You will need to model the kinds of questions to ask that will lead students to guess the identity of the organism on a student’s back. Students should not try to guess the name right away by saying, “Am I a red worm?” Instead they should ask questions that will begin to eliminate some of the organisms. For example, “Do I have legs?” “Am I microscopic in size?”
  2. Using tape or a clothespin, place a card on the back of each student. Have students ask questions of other students to guess what decomposer or scavenger cards are on their backs.
  3. When students have guessed what cards were on their backs, they can return their cards and get new ones.
- E. After the game is over, discuss what type of questions were asked most often to find out about what organisms’ cards were on their backs. Have students verbally share something with the class that they learned in this game. Then ask students to write in their journals one fact that they did not know before about one of the organisms.

### DISCUSSION/QUESTIONS

- A. Ask students:
  - How do the nutrients get into the soil? *Through the work of scavengers and decomposers.* Have students compare their answers to the answers to the same question recorded at the beginning of this lesson.
  - What is the role of scavengers and decomposers in nature? *They break down or decompose organic material.*
  - What would happen if there were no scavengers or decomposers? *We would be surrounded by dead animals and plants.*
  - How do decomposers help plants? *They decompose organic materials into simpler parts that plants can use for growth.*
- B. Remind students of the story, *The Fall of Freddie the Leaf*, that they heard in Lesson 1. Ask students what will happen to Freddie. (Older students can write their responses in their journals.) *He will be eaten by scavengers and decomposed by decomposers and will become part of the soil.*
- C. Discuss with students:
  - Why do metals, plastics, and other human-made things not decompose? *They*

What will happen to Freddie (the leaf)? He will dry out and maybe get stepped on. He will fall a part and, after a while, will become part of the soil in the park.

Submitted by Janet Cohen, sixth-grade teacher, Gold Trail Elementary School, Gold Trail Union School District.

*are usually not organic. There are no known living things that can eat them and break them down. (This topic will be addressed in Lesson 3.)*

- How could people use scavengers and decomposers to reduce the amount of waste going into landfills? (Older students can write their responses in their journals.) *People can keep organic waste out of the landfills and have scavengers and decomposers decompose the organic waste by composting.*

## APPLICATION

- A. Ask students to write a song about decomposition, decomposers, or scavengers, using

We could have compost piles and put all of our fruit and vegetable scraps in them, along with yard waste. Then the worms and decomposers can do their job.

Submitted by Janet Cohen, sixth-grade teacher, Gold Trail Elementary School, Gold Trail Union School District.

a tune everyone in the class knows, such as “Three Blind Mice” or “Old McDonald Had a Farm.”

For example:

### **Decomposition**

*(Sung to the tune of “Three Blind Mice”)  
De-com-po-sition, de-com-po-sition,  
See how things rot,  
See how things rot.  
There’s mold, bacteria, and yeast around.  
They decompose things into the ground.  
They can create a big soil mound.  
De-com-po-sition.*

**Homework Assignment:** Ask students to look for signs of decomposition and of scavengers on their way to and from school or in their neighborhoods. Caution students not to touch decaying

matter. Also, ask students to place back in its original position any rocks or pieces of wood they overturned while looking for scavengers. That way the scavengers will still have their shelter. Students can draw or describe in writing what they saw.

## Day 7

- B. The following day ask students to share their homework assignments.

## EXTENSIONS

- A. Read with students the book, *A Log’s Life* by Wendy Pfeffer. Ask students to help you list the scavengers that lived in the log and what they eat, as described in the book. *Pillbugs eat dead leaves; millipedes eat decaying plants.*
- B. Read with students the book, *The Magic School Bus Meets the Rot Squad* by John May and Jocelyn Stevenson. Have students write and draw a similar story about their own class.
- C. Have students participate in a science fair by doing a project on scavengers or decomposers.
- D. Organize a decomposer and scavenger appreciation day.
- E. Have students compare a red worm to a night crawler.

## RESOURCES

### Videos

*Life on the Forest Floor.* New York: BFA Educational Media, 1989 (12 minutes).

The importance of the forest floor and its inhabitants is explained.

*Soil and Decomposition.* New York: BFA Educational Media, 1986 (16 minutes).

Shows how plant fertilizer is made by nature and how it is manufactured by people. Time-lapse photography shows the decomposition process of dead leaves changing to fertilizer.

*Soil and Water: A Living World.* Irwindale, Calif.: BARR Films, 1984 (16 minutes).

Shows animals that live in the soil.

*Worm Bin Creatures Alive Through a Microscope.* Kalamazoo, Mich.: Flowerfield Enterprises, 1998 (31 minutes).

Through a video microscope, a variety of decomposers (e.g., various fungi and bacteria) and scavengers (e.g., red worms, nematodes, sow bugs, and millipedes) are shown.

### Slide Set

"The Decomposer Food Web." D.L. Dindal, 1990. Available from J. G. Press, Inc., 419 State Ave., Emmaus, PA 18049; (610) 967-4135.

Contains 70 slides and a script on scavengers and decomposers.

### Books

Anderson, Lucia. *The Smallest Life Around Us: Exploring the Invisible World of Microbes with Eight Easy at-Home Experiments*. Illustrated by Leigh Grant. New York: Crown Publishers, Inc., 1978.

Colored illustrations and text (suitable for upper elementary school students) describe various types of microbes, such as molds, yeast, and bacteria.

Donahue, Mike. *The Grandpa Tree*. Boulder, Colo.: Roberts Rinehart, 1988.

Describes the life cycle of a tree and the animals that live in and around it. At the end when grandpa tree falls, the animals make homes in it and the "sawdust mixed with dirt becomes food for flowers."

Forey, Pamela, and Cecilia Fitzsimons. *An Instant Guide to Insects*. New York: Bonanza Books, 1987.

Colored illustrations and text describe insects, including many scavengers.

Henwood, Chris. *Earthworms*. Keeping Mini-beasts series. London: Franklin Watts, 1988. Other titles in the Keeping Minibeasts series include: *Ants*; *Beetles*; and *Snails and Slugs*.

Jaspersohn, William. *How the Forest Grew*. Illustrated by Chuck Eckart. New York: William Morrow & Company, Inc., 1980.

Describes the succession from a grassland to a forest. Also describes the process of decomposition that occurs on the forest floor.

Kalman, Bobbie, and Tammy Everts. *Bugs and Other Insects*. New York: Crabtree Publishing Company, 1994.

Provides information on insects, such as beetles, flies, ants, and termites. Shows the life cycle of a butterfly.

Landry, Sarah B. *Urban Wildlife*. Peterson First Guides series. New York: Houghton Mifflin Company, 1994.

Contains a section that describes the kingdoms of life on Earth. Provides information and colored pictures of many invertebrates that can be found in soil. Also describes vertebrates commonly found in an urban setting.

Lavies, Bianca. *Compost Critters*. New York: Dutton Children's Books, 1993.

Colored photographs and text describe organisms that live in compost.

May, John, and Jocelyn Stevenson. *The Magic School Bus Meets the Rot Squad: A Book About Decomposition*. New York: Scholastic, Inc., 1995.

Ms. Frizzle's class learns about decomposition.

Milne, Lorus J., and Margery Milne. *A Shovelful of Earth*. Illustrated by Margaret LaFarge. New York: Henry Holt and Company, Inc., 1987.

Describes soil; useful as a reference.

Mound, Laurence, and Stephen Brooks. *Insects*. DK Pockets series. New York: Dorling Kindersley Publishing, Inc., 1995.

Colored photographs and text describe a variety of insects. This book contains chapters on specific habitats and associated animals.

Pfeffer, Wendy. *A Log's Life*. Illustrated by Robin Brickman. New York: Simon & Schuster Books for Young Readers, 1997.

Describes the life cycle of a tree and focuses on the life that a log supports.

Pringle, Laurence. *The Hidden World*. New York: Macmillan, 1977.

Describes and illustrates some animals that live in soil.

Silver, Donald M. *One Small Square Backyard*. Illustrated by Patricia J. Wynne. New York: W.H. Freeman and Company, 1993.

Colored illustrations and text describe plants and animals that can be present in a yard, including those found in soil.

Viorst, Judith. *The Tenth Good Thing About Barney*. Illustrated by Erik Blegvad. New York: Macmillan Publishing Company, 1987.



A child's cat, Barney, dies and his father asks the child to determine ten good things about Barney. The tenth good thing is that Barney will enrich the soil in which plants will grow.

### **Audiocassette**

*Dirt Made My Lunch*, recorded by the Banana Slug String Band, 1989. Distributed by Music for Little People.

Includes the song "Decomposition" by Steve Van Zandt.

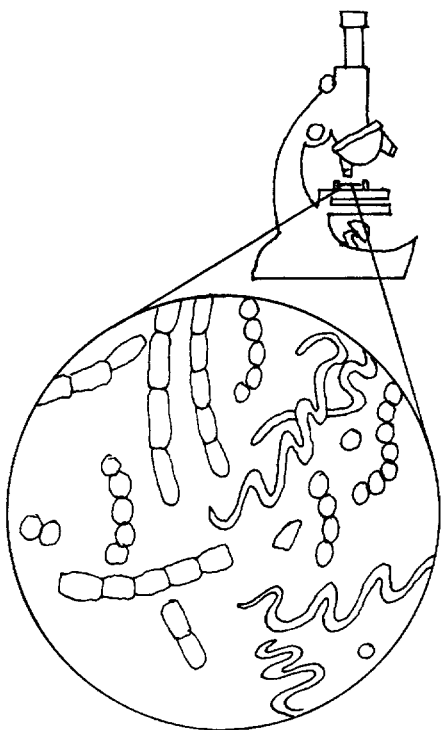
### **Magazine Article**

Johnson, Cecil E. "The Wild World of Compost," *National Geographic*, Vol. 158 (August, 1980), 272–84.

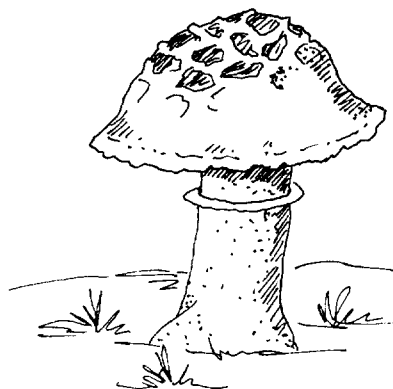
Contains photographs of a variety of scavengers.

# SCAVENGERS AND DECOMPOSERS CARDS

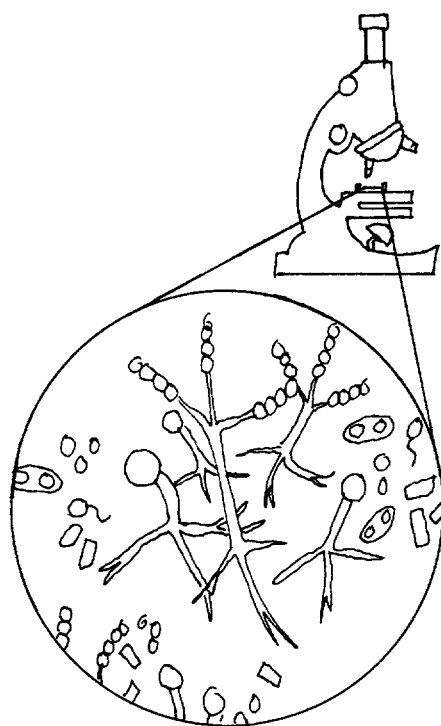
## 1. Bacteria



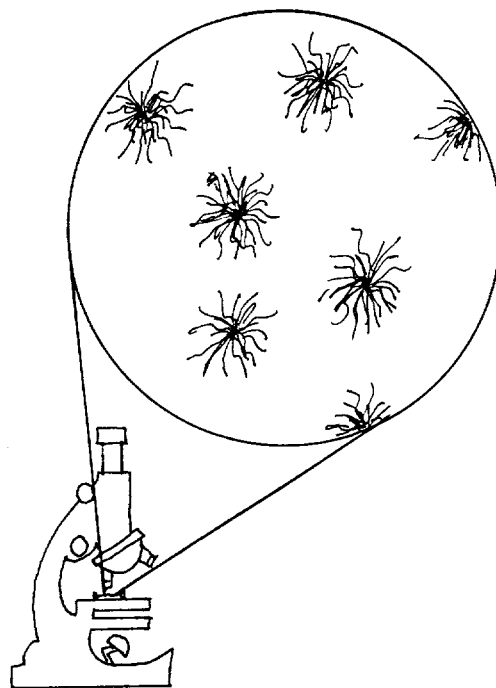
## 2. Fungus—mushroom



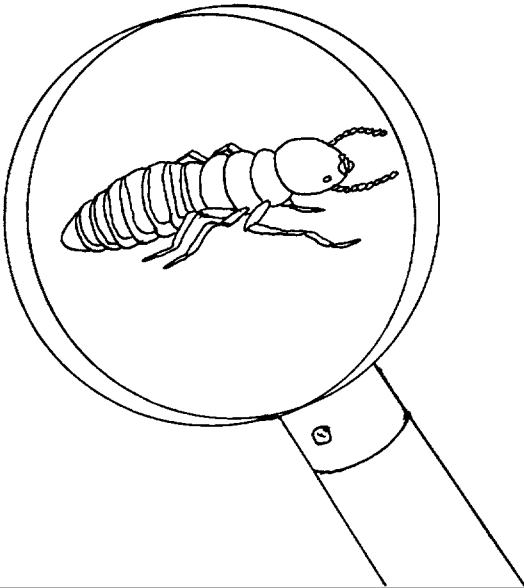
## 3. Fungus—mold



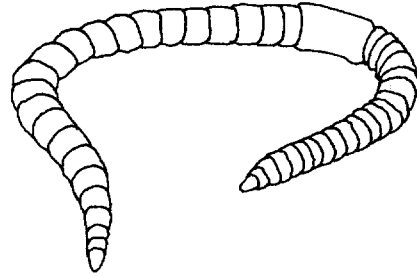
## 4. Actinomycetes



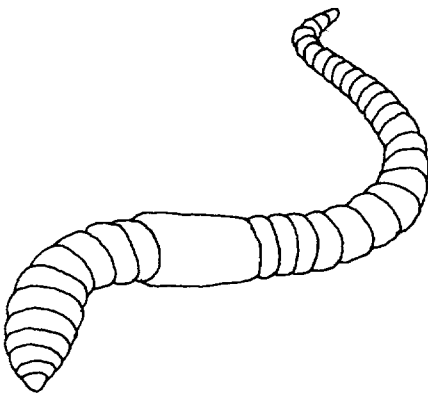
**5. Termite**



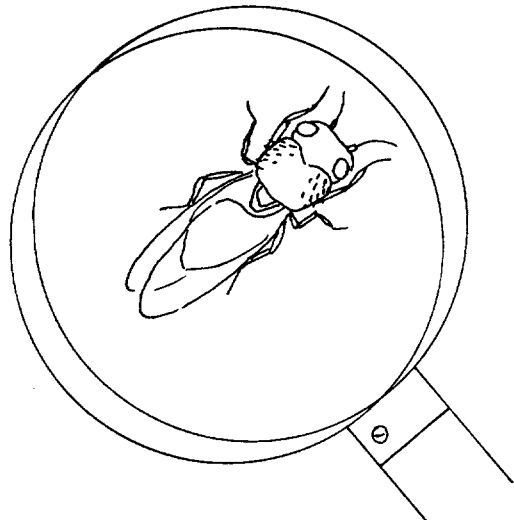
**6. Red worm**



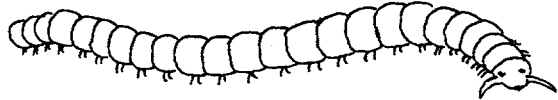
**7. Night Crawler**



**8. Fruit fly**



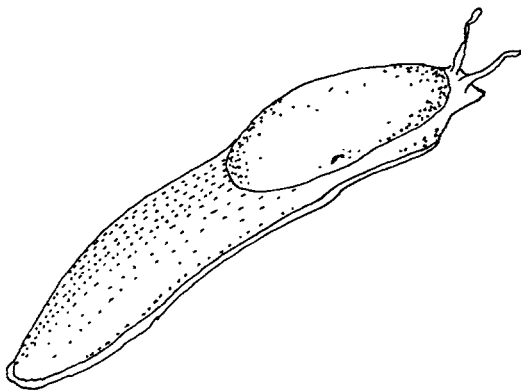
### 9. Millipede



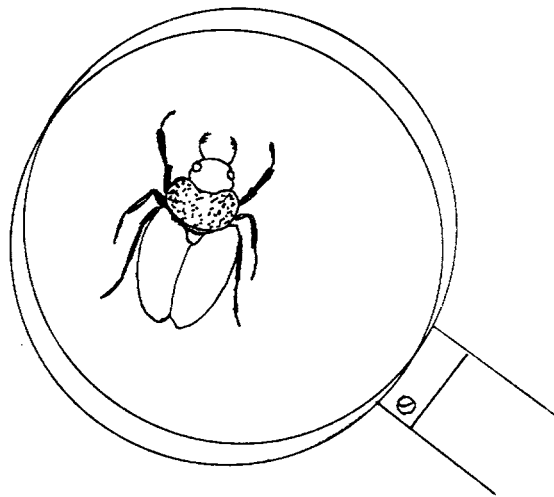
### 10. Sow bug



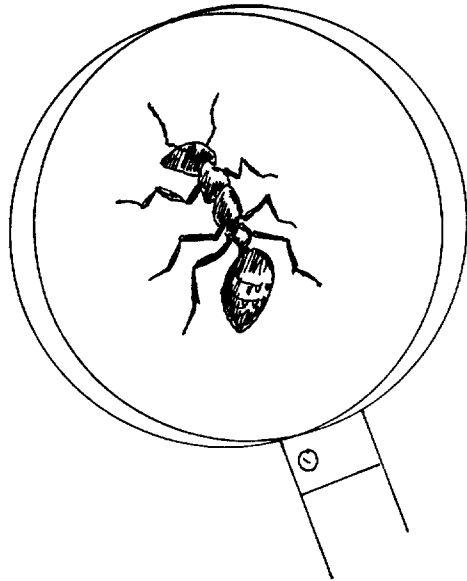
### 11. Slug



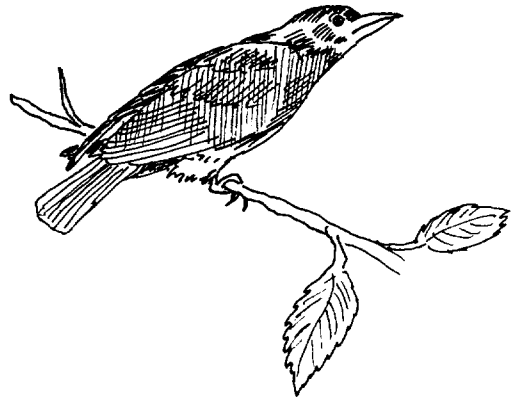
### 12. Scarab Beetle



**13. Ant**



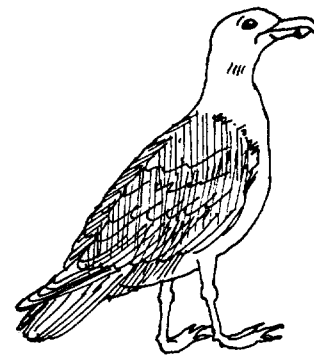
**14. Crow**



**15. Turkey vulture**



**16. Gull**



Name: \_\_\_\_\_

## DECOMPOSERS INVESTIGATION SHEET

A different type of decomposer has been introduced into each of the bags. Each decomposer has specific characteristics that scientists use to figure out their type. Use the hand lens, and **without opening the plastic bag**, observe the contents in each bag. Try to see any difference in growth patterns among the types of decomposers. Record the date and what you observed today on the lines below. Use the back of this sheet if you need more room to write.

Bag 1. Date: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Bag 2. Date: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Bag 3. Date: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Bag 4. Date: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Bag 5. Date: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

# BACKGROUND INFORMATION FOR THE TEACHER

There is no waste in nature; the wastes or dead bodies of one form of life become food or nutrients for other forms of life. When something dies, decomposers use the dead material as food. Decomposers include microscopic organisms, such as bacteria and fungi (e.g., yeast, mold, mildew).

Most decomposers cannot be seen with the naked eye, but their colonies can be observed. For example, the grayish cobweb-like material in compost indicates the presence of a type of bacteria called actinomycetes (pronounced “ak-tin’-o-my-CEE’-tees”). Actinomycetes and fungi work together to decompose the toughest organic material, such as cellulose and even lignin, which is the main component in paper.

Fungi (pronounced “fun-guy”) are not plants or animals; they belong to their own kingdom: Fungi. Fungi means “more than one fungus.” Fungi cannot produce their own food because they have no chlorophyll, so they grow on organic materials to survive. Fungi help break down organic matter, such as dead leaves and grass, and turn them into rich dark compost. Molds, mildews, and yeast are fungi. Most fungi have a nucleus (genetic materials surrounded by a membrane) and several other internal parts surrounded by membranes.

Threads of mold, a type of fungi, can be seen with a magnifying lens. Some threads will have dark round sacs that contain spores. Spores are like seeds. They are often spread by wind or by an insect to a favorable area, where they will open and a new thread will grow. A mold colony is formed as the threads become longer and branch into more threads. Molds feed on organic wastes and help to break them down. This action releases nutrients contained in the organic waste to the soil.

Yeast is also a type of fungi. They also depend on other organisms for food. The yeast feeds on organic matter, causing it to decay or break down into smaller parts. A yeast cell is shaped like an egg. Some have little bumps on them called buds. These buds grow bigger and break away to become a new yeast cell.

Bacteria are single-celled microscopic organisms. They are placed in a classification kingdom called Monera. They have no distinct nucleus or other internal parts surrounded by membranes.

Some species, called aerobic bacteria, require oxygen to live and others, called anerobic bacteria, do not. Bacteria are eaten by protozoa, worms, snails, arthropods, and other small organisms.

Bacteria are abundant in air, water, soil, and in or on other organisms. Although some can transmit diseases, most act as decomposers and get the nutrients they need by breaking down complex organic compounds in the tissues of living or dead organisms. Bacteria break these organic compounds into simple chemical substances that can be recycled into other organisms.

Some bacteria multiply by a simple division of cells (each cell divides into two). Some species reproduce by budding (a bud forms on a parent cell and then detaches to become a new cell). Still others reproduce by generating spores, which grow into new bacteria cells.

All living things need nutrients to live. Animals get nutrients from the plants and/or other animals they eat. Waste excreted by organisms is high in nutrients. When living things die, their bodies are also high in nutrients. Decomposers can release these nutrients into the soil where they might be held in solution by water. Plant root hairs absorb this moisture full of nutrients, and the nutrients are transported into the stems and leaves of the plant. When leaves and other plant parts fall to the ground, their nutrients are returned to the soil by decomposers. When something organic, like a leaf, decomposes, it is actually recycled.

All previously living things decompose. If nothing decomposed, the Earth would be covered with dead animals and plants. In addition, the soil would not get back the nutrients that plants need to grow.

Decomposition does not happen all at once. It involves many steps in which many living things participate. Organic material is consumed, excreted, and eaten again by different life forms. Scavengers can be seen with the naked eye and are called macroorganisms. Most of these animals cannot eat fresh organic material, like leaves, until it has been broken down by microorganisms, such as fungi and bacteria. Once the organic matter is softened, scavengers, such as red worms, night crawlers, sow bugs, millipedes, slugs, mites, and various types of insects,

such as beetles, termites, and ants, break down the substances into smaller parts. Then decomposers eat these smaller parts and break them down further into simpler components, like nutrient compounds (protein, vitamins, minerals, and carbohydrates). These simpler materials, which are essential for life, can now be absorbed from the soil by plants. Note that only decomposers actually decompose organic material into simpler components.

There are larger animals that play the role of scavengers by eating waste that has begun to decay. These scavengers include crows, turkey vultures, magpies, gulls, and coyotes. They can be called “nature’s clean-up crew.”

The type of soil, moisture content of the soil, temperature, and kinds of organisms present all contribute to the rate of decomposition in soil. Ideal conditions for aerobic (oxygen-requiring) bacteria, fungi, and other microorganisms include the presence of water and air. Most decomposers live in the soil or leaf litter. However, some molds travel through the air and can decompose fruit and other organic matter that are not in or on top of soil.

Sunlight, water, and air can also break down both organic and inorganic substances. This lesson focuses on living things (scavengers and decomposers) that break down organic matter.